AMENDMENTS TO THE SPECIFICATION

Please amend the title, as follows:

CATHODE MATERIAL INCLUDING RARE EARTH METAL USED AS ELECTRON EMISSION SOURCE FOR ELECTRON BEAM APPARATUS

Please amend paragraphs [0006] through [0008], [0011], [0023] and [0024], as follows:

[0006] For instance, a metal cathode based on ~~lanthanium~~ lanthanum hexaboride(LaB_6) is known to have a higher degree of strength and electron emission power compared to oxide cathodes, and a single crystal cathode can emit a higher electron current density on the order of 10 A/cm^2. However, the ~~lanthanium~~ lanthanum hexaboride cathode has a short lifetime, and thus it has been used only partially in a vacuum electronic apparatus whose cathode unit can be replaced. The reason that the ~~lanthanium~~ lanthanum hexaboride cathode has a short lifetime is due to high reactivity with the components of a heater, and to the fact that ~~lanthanium~~ lanthanum hexaboride is in contact with the components of the heater, e.g. tungsten, to form fragile compounds.

[0007] US Patent No. 4,137,476, issued to Ishii, et al., for *Thermionic Cathode* discloses a cathode where a barrier between ~~lanthanium~~ lanthanum hexaboride and the body of the heater is formed, in order to eliminate the reaction possibility. But, according to this method, the production cost of the cathode increases significantly and it is difficult to improve the lifetime of the cathode.

[0008] Also, as a material with a high electron emission specific density, an alloy including iridium and a small amount of a rare earth metal of the cerium group (~~lanthanium~~ lanthanum, cerium, praseodymium, neodymium, samarium), (S.E. Rozhkov et. al, *Work function of the alloy of Iridium with Lanthanium, Cerium, Praseodymium, Neodymium, Samarium*, Journ. Radiotechnika I electronica, 1969, v.14, No.5, p936-analogue) has been known.

[0011] Russian Federation Patent No. 2052855 discloses as a cathode material of an alloy of iridium, ~~lanthanium~~ lanthanum or cerium, tungsten, and rhenium. In this patent, the cathode lifetime has been increased by including in the alloy tungsten or rhenium, but the latter two metals are fragile, and thus the cathode including them is also fragile and the electron emission power decreases.

[0023] Rare-earth metals are a group of trivalent metallic elements that occur together. The rare-earth metals include elements with atomic numbers 57 through 71, from ~~lantanum~~ lanthanum to ~~luterium~~ lutetium, and yttrium, element 39, and scandium, element 21. The cerium metals are a group of rare-earth metals including elements with atomic numbers 57 through 63, including the metal cerium. This group is also called "light rare earths." The metal ytterbium (atomic number 70)

may also be included in this group because of its light weight.

[0024] The cathode of the invention includes between 0.5 to 9.0 % by weight of a rare earth metal of the cerium group. If the amount of the rare earth metal of the cerium group is less than 0.5 % by weight, then the lifetime of the cathode shortens due to the lack of the rare earth metal of the cerium group that is an active component, and if it is more than 9.0 % by weight, then there is a problem of forming on the cathode surface compounds such as Ir_2Ce or Ir_2La whose electron emission characteristics is low. Here the rare earth metal of the cerium group is preferably one or more selected from the group including ~~lanthanium~~ lanthanum (atomic number 57), cerium (atomic number 58), praseodymium (atomic number 59), neodymium (atomic number 60) and samarium (atomic number 62).